SECTION 205 - CONCRETE PAVEMENT

1. GENERAL

This item shall consist of a single course of portland cement concrete pavement conforming to the details shown on the plans, constructed on a prepared subgrade in accordance with all of the provisions of these specifications in conformity with lines, grades, sections, thickness and typical cross sections shown on the plans.

2. FORMS

Side forms for this work shall be of metal. They shall be of a depth at least equal to the edge thickness of the work prescribed. Built up forms shall not be used except with the written permission of the Inspector, and only for pavement with odd thickness or in unusual situations. The forms shall be straight and free from warp. The maximum deviation of the top surface of any section from a straight line shall not exceed one-eighth (1/8) inch. The method of connections between sections shall be such that the joint formed shall be free from play or movement in any direction and the forms shall be of an approved section, with a base width of at least eight (8) inches, and so secured as to resist, without springing or settlement, the pressure of the concrete when placed and the impact and vibration of the finishing machine. The minimum length of each section of steel forms used on tangents shall be ten (10) feet.

The supply of forms shall be sufficient to permit them to remain in place at least twelve (12) hours after the concrete has been placed or longer if deemed necessary. Bent, twisted or broken forms shall not be used.

When the concrete pavement is of irregular dimensions and is to be finished by hand methods, steel forms with a minimum base width of six (6) inches or wood forms may be used. Wood forms shall be not less than two (2) inches in thickness on tangents or one (1) inch in thickness on curves and of a design approved by the Inspector. All forms shall have a depth equal to the edge thickness of the pavement.

3. SETTING FORMS

The forms shall be jointed neatly and shall be set with exactness to the required grade and alignment and supported in such a manner that during the entire operation of compaction and finishing they will not at any time deviate more than one-eighth (1/8) inch in elevation from a straight edge ten (10) feet in length. Forms shall be set at least five hundred (500) feet in advance of the mixer. All forms shall be cleaned and oiled before being set.

The building of pedestals of earth or other materials to bring the forms to the required grade will not be permitted. The length and number of pins shall be sufficient to maintain the forms at the correct line and grade. After the forms are in place, they shall be firmly seated by the use of a mechanical form tamper.

4. PLACING CONCRETE

The mixer shall be operated outside the forms at all times except at locations where it is not feasible to do so. Excessive loss of cement from mixer skips on windy days or for

any other reason, shall result in the use of additional cement in the batches to offset the loss or the concreting operation shall be discontinued.

Where grades of 3% or greater are encountered, the concreting operation shall proceed upgrade.

Just prior to the depositing of concrete, the surface of the subgrade shall be thoroughly wet, but shall not show pools of water when the concrete is placed. All ready mixed concrete must be deposited from the mixer truck to the formed area within one (1) hour of the truck arriving on site.

The concrete shall be deposited on the subgrade in successive batches for the full width between forms and in a manner which will require as little rehandling as possible. Spreading shall be done by an approved mechanical spreader in a manner that will prevent segregation and separation of the materials. Any additional spreading necessary shall be done with hand shovels. The amount of material deposited shall be sufficiently in excess of that required to form the pavement to the required cross section after consolidation, to provide a roll of concrete ahead of the front screed of the finishing machine for the full length of the screed. The vibrators which are required to be mounted on the mechanical spreader, to properly consolidate the concrete next to the forms, shall be operated only during the first pass of the spreader. Excessive tamping or finishing resulting in bringing an excess of mortar to the surface will not be permitted.

If mesh or bar mat reinforcing is used, the concrete shall be deposited and struck off with a strike-off operating from the side form to form a surface that will permit the reinforcement to be placed and maintained at the required elevation. If, for any reason, the additional cross section of concrete cannot be placed for a time lapse of 15 minutes or more, dampened burlap shall be placed over existing concrete until concreting operation can commence. After concreting has stopped for a time lapse of 30 minutes, a header shall be set to form a joint.

5. WELDED STEEL WIRE FABRIC CONCRETE REINFORCEMENT

Unless otherwise specified, wire fabric furnished under this specification shall be No. 4 wire in a six (6) by six (6) pattern weighing 58# per hundred (100) sq. ft. and shall conform to the latest requirements for "Welded Steel Wire Fabric for Concrete Reinforcement," "A.A.S.H.O. Designation M55."

6. PLACING REINFORCEMENT

All pavement reinforcement shall be placed as shown on the plans. All marginal bars, dowel bars, and tie bars required by the plans shall be held in proper position by sufficient approved metal bar supports or pins.

All concrete pavement patches fifteen feet by sixteen and one half feet (15' x 16.5') or smaller shall be doweled at the transverse joints. Wire mesh shall not be placed less than two nor more than three inches from the finished surface of the pavement. Laps in adjacent sheets or mats of reinforcement shall be as shown on the plans. Laps parallel to the center line of the pavement will not be permitted except for unusual widths of pavement lanes or for irregular areas. If the plans do not show dimensions for laps, the minimum lap either perpendicular or parallel to the center line of the pavement shall be

twelve (12) inches. The adjacent sheets shall be fastened or tied together to hold all parts of the sheets in the same plane.

7. FINISHING

After the concrete has been spread and struck off, it shall be further struck off and consolidated by use of an approved finishing machine or vibrating screed to such an elevation that when finishing operations are completed, the surface will conform to the required grade and crown. The finishing machine shall be operated over the entire surface at least twice. A uniform roll or ridge of concrete at least two (2) inches above the pavement grade shall be maintained ahead of the finishing machine or vibrating screed for its entire length during its initial pass. Excessive tamping or finishing resulting in bringing an excess of mortar to the surface will not be permitted. Final finishing shall consist of eliminating tool marks, edging, and applying the final surface texture. This final finish shall not be applied until the entire surface has been straight-edged, using a ten (10) foot straight-edge, and any irregularities corrected.

8 CURING CONCRETE

Liquid membrane forming compounds furnished under this specification shall conform to the requirements for Type 2 - "White Pigmented Compound," as specified in the latest revisions of the "Standard Specifications for Liquid Membrane Forming Compounds for Curing Concrete," A.A.S.H.O. Designation M14B.

The curing membrane shall be applied while the surface of the concrete is still moist, but no free water remains and shall be applied to the exposed surfaces including the sides of the pavement at the rate of not less than one (1) gallon per two (2) hundred square feet. When hand operated sprays are permitted, the equipment supplying the pressure shall be capable of supplying a constant and uniform pressure to provide uniform and adequate distribution of the curing membrane compound at the rates required. If from any cause, such as rainfall soon after its application, the curing membrane is damaged, the Contractor shall immediately apply another application of curing membrane to the surface of the pavement. The rate of application for the replacement membrane shall be the same as for the original membrane.

The curing membrane shall be protected from damage from any cause until the concrete reaches an age of seven (7) days. No traffic, including workmen and pedestrians, shall be allowed on the surface of the pavement until the expiration of the seven (7) days curing period.

9. EXPANSION JOINTS

The subgrade at expansion joints shall be accurately trimmed to the required cross section and to the proper depth of the pavement. If for any reason the subgrade is too low or if open spaces exist below the joint, the joint shall be removed and the subgrade backfilled and tamped firmly to proper elevation and the joint reset. The entire joint assembly shall be of a type designated on the plans and shall be installed in such a position that the center line of the joint assembly is perpendicular to the center line of the slab and the dowels lie parallel to the slab surface and parallel to the center line of the slab.

The joint shall be securely staked or fastened in place prior to placing the concrete

and in a manner to insure the joint and dowel bars will remain in their proper position after the concreting and finishing operations are completed.

A slip sleeve of the dimensions shown on the plans shall be placed on the greased end of each dowel. The greased ends shall be free to slide in the dowel holder and shall extend in the direction as indicated on the plans. Any excess grease on the dowel holder shall be removed.

Transverse expansion joints of 1" in thickness shall be placed at right angles to the center line at intervals of not more than 150 feet through the pavement, or as shown on the plans, or as directed by the Inspector. All expansion joint material shall be limited extrusion type, 5-1/2 inches wide, and dowel holes shall be clearly drilled or punched. Joints for pavement designed for two (2) or less lanes of traffic shall be assembled and installed in one (1) continuous piece or the connections between sections shall be made rigid and tight to prevent offsets in sections of the joints. The length of individual pieces of the expansion joint filler shall be not less than the width of one traffic lane of pavement.

Concrete shall not be dumped from the mixer bucket in a manner that will permit the concrete to flow against the joint. The bucket shall be brought to a complete stop directly over the joint and the concrete dumped directly over the joint. If this method of placing concrete at the joint results in the displacement of the joint, the concrete shall then be shoveled against both sides of the joint simultaneously. Extreme care shall be exercised in placing, compacting and finishing concrete at the joints to prevent displacement of the joints and to avoid the formation of honeycombs and voids. The concrete along the joints shall be thoroughly consolidated by the use of internal type vibrators.

The finishing machine shall be operated in a manner that will prevent displacement of the joint. If for any reason it is necessary to straighten a joint, any depression caused by this operation shall immediately be filled with fresh concrete, respaded and brought to the original crown in advance of the longitudinal finisher. Any fluid laitance or mortar caused by the operation shall be removed and replaced with fresh concrete.

As the finishing machine approaches the joint on the first trip, the excess concrete shall be shoveled ahead and the tamper and each screed, in turn, shall be lifted over the joint. On the second trip of the finishing machine, the screed may be operated over the joint.

10. CONTRACTION JOINTS

Contraction joints shall be of the type and spacing shown on the plans, shall be constructed at right angles to the center line and perpendicular to the surface of the pavement.

Ribbon type contraction joints which are formed by inserting a strip of pre-molded bituminous parting strip while the concrete is still green shall be machine installed. The strip shall be installed in its true position with the top edges not over one-sixteenth (1/16) inch below the finished surface of the pavement. The parting strip shall be placed in the pavement immediately after transverse finishing is completed. Care shall be taken during this operation to disturb the concrete as little as possible.

Any thin mortar or laitance formed by this operation shall be removed and replaced with fresh concrete.

Sawed contraction joints shall be cut by means of an approved concrete saw. The joints shall not be sawed until the concrete has hardened to the extent that tearing and raveling is precluded, nor later than the day the earth cover or quilts are removed. Part or all of the joints shall be sawed before the pavement starts shrinking and before uncontrolled cracking takes place. The spacing of the joints that must be sawed early will depend on several factors but shall be at such intervals that will prevent uncontrolled cracking. Any procedure which results in premature and uncontrolled cracking shall be revised immediately by adjusting the sequence of cutting the joints or the time interval involved between the placing of the concrete or the removal of the curing media and the cutting of the joints. In no case shall the pavement be left uncovered overnight without having the joints sawed.

The joints shall be sawed at the depth, spacing and lines shown on the plans. Water must be sprayed on the saw blades at all times during cutting when using a diamond edge saw blade. If there are gutters and curbs, they shall be cut to the proper depth to prevent erratic cracking.

All contraction joints in adjacent widths of multiple lane pavements shall be sawed before uncontrolled cracking occurs. When extreme conditions exist which make it impracticable to prevent erratic cracking in the adjacent widths of multiple lane pavements by sawing the joints early, at the direction of the Inspector, a bituminous parting strip may be substituted for the sawed joints through the adjacent widths.

11. LONGITUDINAL JOINTS

Longitudinal joints shall be constructed in conformance with the details shown on the plans. When the fabricated steel strip is specified, it shall be held rigidly in place with an adequate number of pins driven into the subgrade to insure that it will remain true to line and grade during concreting and finishing operations.

On multiple lane pavements where longitudinal joints are constructed at the form line, an approved recess form and tie bars shall be required. The full depth fabricated steel strip designed for other longitudinal joints shall not be used. When sawed joints are specified or used, suitable guide lines or devices shall be furnished to insure cutting the longitudinal joint on the true line as shown on the plans. The longitudinal joint shall be sawed not later than the day the curing media is removed and shall in all cases be sawed at a time that will preclude erratic or uncontrolled cracking.

If sawed, this joint shall subsequently be sealed with the type of joint sealing compound called for on the plans.

12. CONSTRUCTION JOINTS

A butt construction joint shall be made perpendicular to the center line of the pavement at the close of each day's work and also when the process of depositing concrete is stopped for a length of time such that, in the opinion of the Inspector, the concrete will have taken its initial set. This joint shall be formed by using a clean plank header having a thickness of not less than two (2) inches, a width of not less than the

thickness of the pavement and a length of not less than the width of the pavement. The header shall be cut true to the crown of the finished pavement and shall be accurately set and held in place in a plane at right angles to center line and perpendicular to the surface of the pavement.

Dowel bars or lead transfer devices shall be used in all construction joints in accordance with the details shown on the plans. Where such details are not shown on the plans, tie bars as provided for the longitudinal joint and spaced at eighteen (18) inch centers, shall be placed across the joint in a plane parallel to the surface of the pavement approximately midway between the top and bottom surfaces of the pavement. The edges of the joint shall be grooved, edged and sealed with the material used for sealing expansion and contraction joints.

No construction joints shall be placed within ten (10) feet of an expansion, contraction or other construction joint.

13. SEALING JOINTS

The joints shall be sealed with the type or types of joint sealing compound called for on the plans or in the proposal. The joints shall first be thoroughly cleaned of all loose scale, dirt, laitance or other foreign matter by the use of scrapers, or resawing if necessary, and flushed clean with water and air under pressure. Free water shall be removed from the joint with air jets before the joints are sealed. If the hot poured type is used, the faces of the concrete at the joint shall be thoroughly dry and the sealing operations shall not be performed until after the curing period is finished. If the cold poured type is used, this operation may be performed at any time after the concrete has taken a hard set and the concrete surfaces at the joint may be moist.

All joints, expansion, ribbon or sawed, and all premature or natural cracks, if such occur, shall be filled from the bottom of the joint or crack to the surface of the pavement and all excess joint material removed at the time of final inspection.

14. HOT TYPE JOINT SEALING COMPOUND

This shall be a plastic material that, when heated, will completely fill the joints when poured from a suitable container or forced into the joint opening under low pressure.

This type of joint sealing shall comply with the requirements of the Standard Specification for "Concrete Joint Sealer, Hot Poured Elastic Type" AASHTO Designation M173.

Any materials which are injured by heating shall not be used in the joints. Injury shall be determined by subjecting the materials to tests as prescribed by the Inspector. Injury may be considered to have occurred when materials have been heated beyond the maximum temperatures recommended by the manufacturer of the materials.

15. EQUIPMENT FOR HEATING HOT POURED JOINT COMPOUND

Heating equipment shall consist of a heating unit that prevents a direct flame against the surface of the container holding the compound and that provides continuous mechanical agitation of the compound being heated. The compound melting unit shall be so constructed as to permit the material to be heated to a pouring consistency within one-half (1/2) hour without injury to the material. Also have an accurate readable temperature

gauge. The capacity of the unit shall not be less than two hundred (200) pounds per hour.

16. FINAL CLEAN UP

Upon the completion of the work and before starting work on any other contract the Contractor may have with the City of Salina, and before acceptance and final payment will be made, the Contractor, at his own expense, shall clean the pavement and adjacent property defaced or occupied by him in connection with the work, of all rubbish, weeds, brush, excess materials, false work, temporary structures and equipment.